GE
Grid Solutions

UR Family

GOOSE Communication between UR and Integrated MU320

Application Note

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This document outlines configuration required for a GE Universal Relay (UR) and a GE Reason MU320 Integrated Merging Unit for establishing GOOSE communication between them.

Introduction

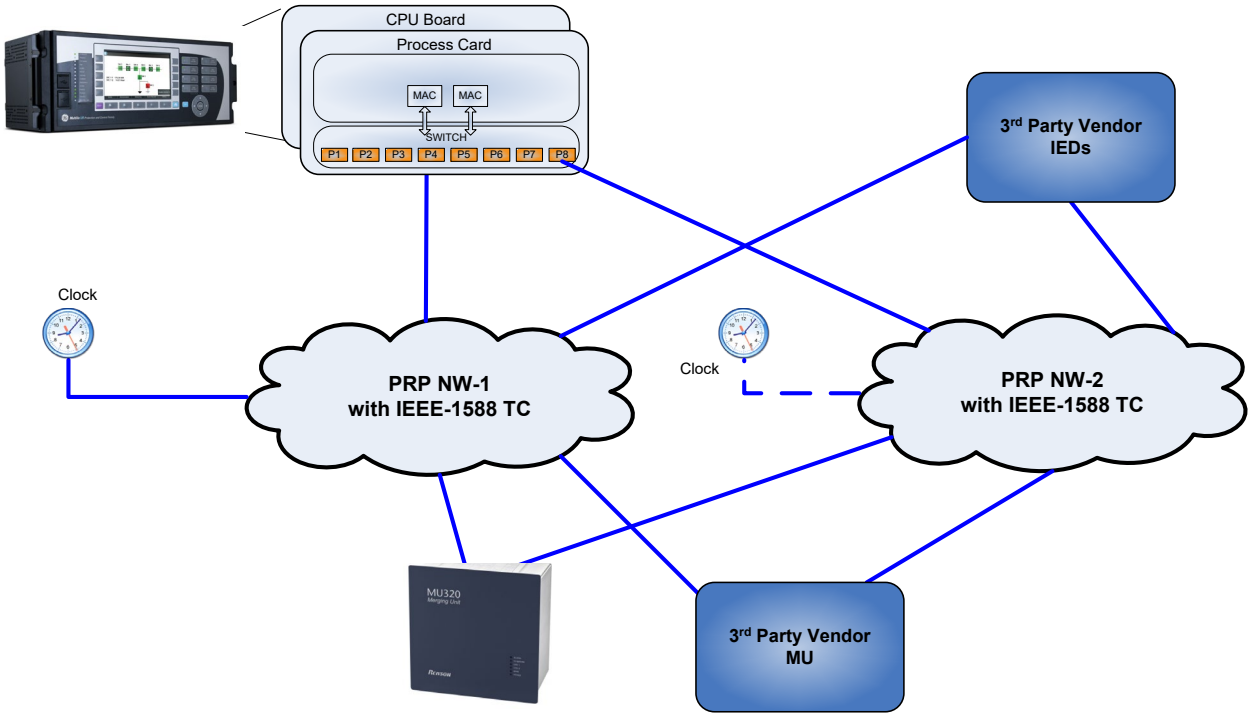
The UR family of protection relays with firmware version 7.80 and higher have capability to include a process bus module for sampled values (SVs) and GOOSE communication with merging units. Peer-to-peer GOOSE messaging is used between URs and merging units for tripping circuit breakers via binary outputs and receiving breaker statuses in a UR relay. Any transducer-related analog signals also can be shared between a UR and an MU320 unit via GOOSE communication.

This document contains configuration examples to establish GOOSE communication between a UR and MU320.

Configuration to operate contact outputs in MU320 from UR

Consider the network diagram that consists of a UR and an MU320 unit where GOOSE communication is established between the Intelligent Electronic Devices (IEDs) and the merging unit. The contact output operation commands are transmitted as GOOSE Booleans from the UR to the MU320 unit for operating binary outputs located on the MU320 unit. In the opposite direction of network path, breaker statuses that are received as binary inputs in the MU320 unit are sent as GOOSE Booleans to the UR.

Figure 1: Network setup



To send contact output operate commands from a UR to an MU320 unit:

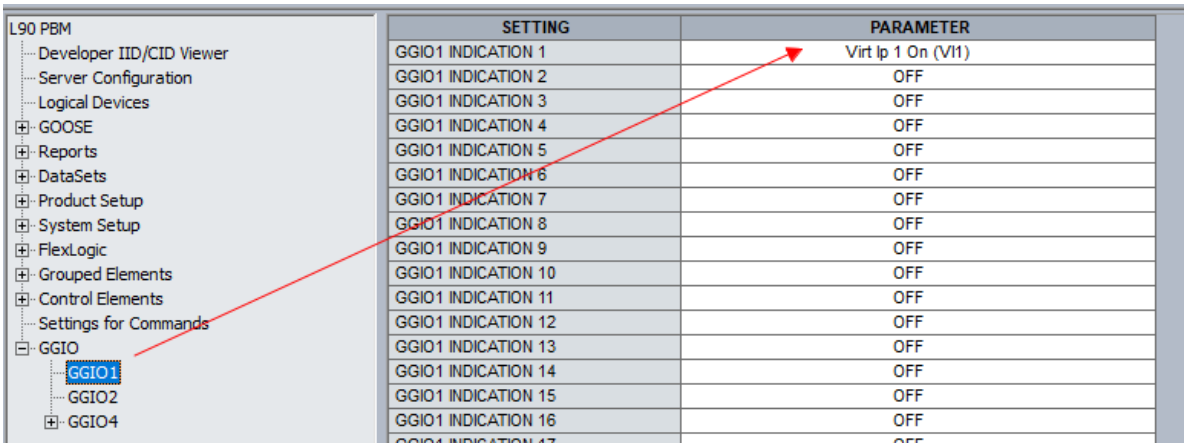
1. Power-on the UR and MU320 unit. Connect both devices to the same network using rear Ethernet ports on each of the devices through an Ethernet managed switch.
2. Open the EnerVista UR Setup software on the computer and establish communication with UR.
3. In this example, Virtual Input 1 is being sent from the UR to the MU320 unit for operating the binary output 1 of the MU320 unit. Hence, Enable the Virtual Input under **Settings > Inputs/Outputs > Virtual Inputs**. Also enable the events for the operand in the UR that is driving the contact output of the MU320 unit. In the example shown, events are enabled for Virtual Input 1, which means that an event will be logged for VI1 activation when a contact output operation command is sent from the relay.

Figure 2: EnerVista software setup

SETTING	PARAMETER
Virtual Input 1 Function	Enabled
Virtual Input 1 ID	Virt Ip 1
Virtual Input 1 Type	Latched
Virtual Input 1 Events	Enabled

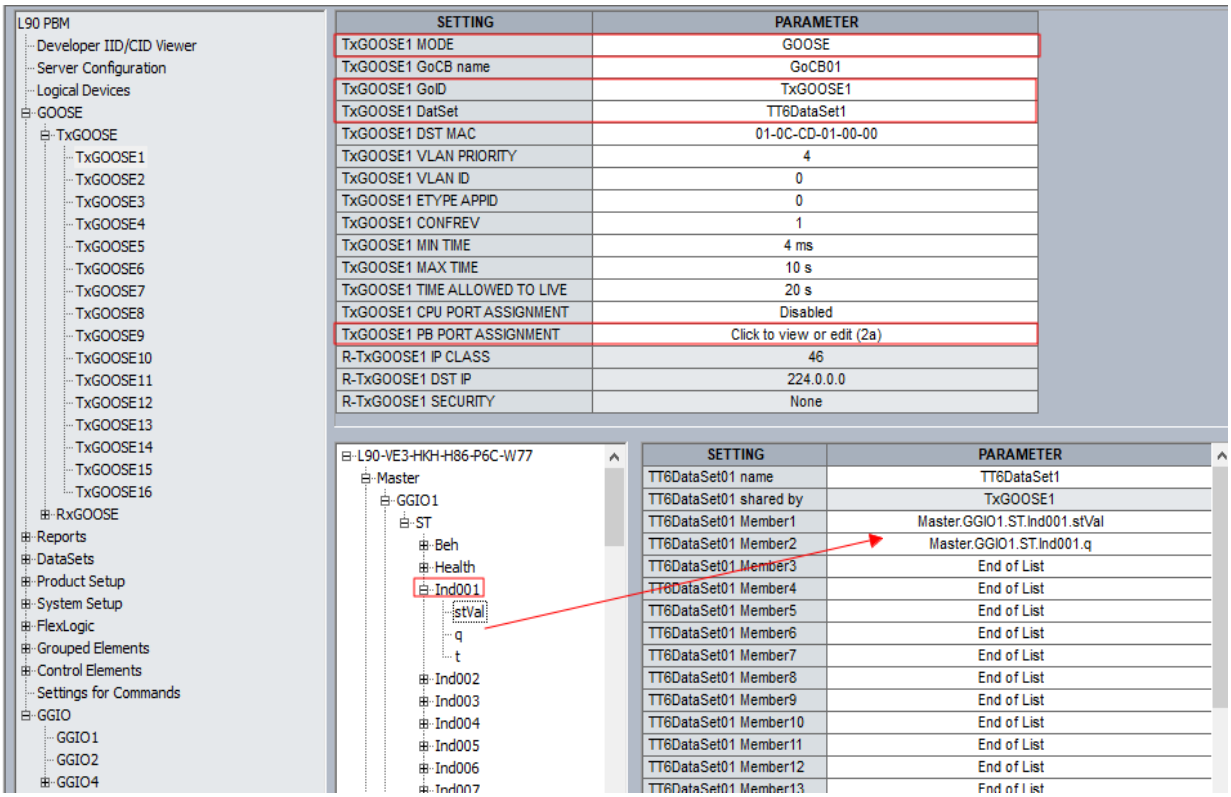
4. Under **Settings> Product Setup> IEC61850>GGIO> GGIO1**, assign binary operand Virtual Input 1 ON to the **GGIO1 INDICATION 1** field.

Figure 3: GGIO setup for Virtual Input 1



5. Under the transmission section of GOOSE (TxGOOSE), that is, **IEC61850> GOOSE>TxGOOSE>TxGOOSE1**, go to TxGOOSE1. Configure the **TxGOOSE1 MODE** to GOOSE, **TXGOOSE1 Datset** to TT6DataSet1, and **TxGOOSE1 PB PORT ASSIGNMENT** to the PBM port through which it is connected to the network (communicating to the MU320 unit). Also in this window, map the GGIO1 Indication 1 status value (stVal) to TT6Dataset01. If you want to send quality attribute, then map the quality attribute to TT6DataSet01. GE recommends using TT6 datasets for tripping operation as they are associated with Fast GOOSE. TT3 datasets are associated to slow GOOSE, hence GE recommends them to be used for control operation. Booleans in fast GOOSE datasets are designed for the TT6 transfer time class (3 ms), while Booleans in the Normal datasets are designed for the TT3 class (100 ms).

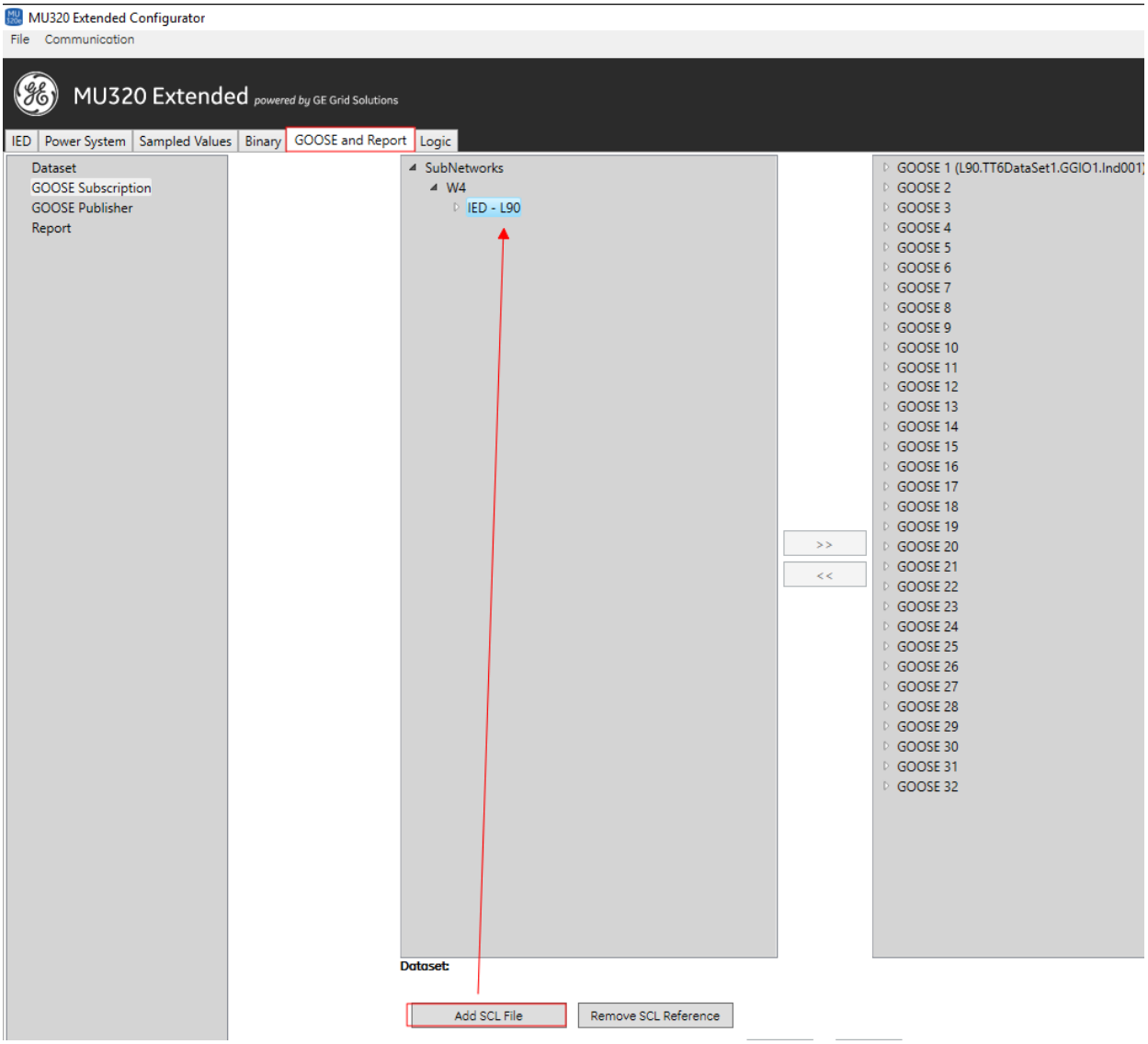
Figure 4: GOOSE transmission setup



6. Once these IEC 61850 settings have been configured, click the **Save** button to retain them. While the software saves the settings, a new CID file is created in the relay. Once a new CID file is created, download the CID file from the relay and save the file to the computer.
7. Open the MU320 unit configurator. Establish communication with the MU320 unit.

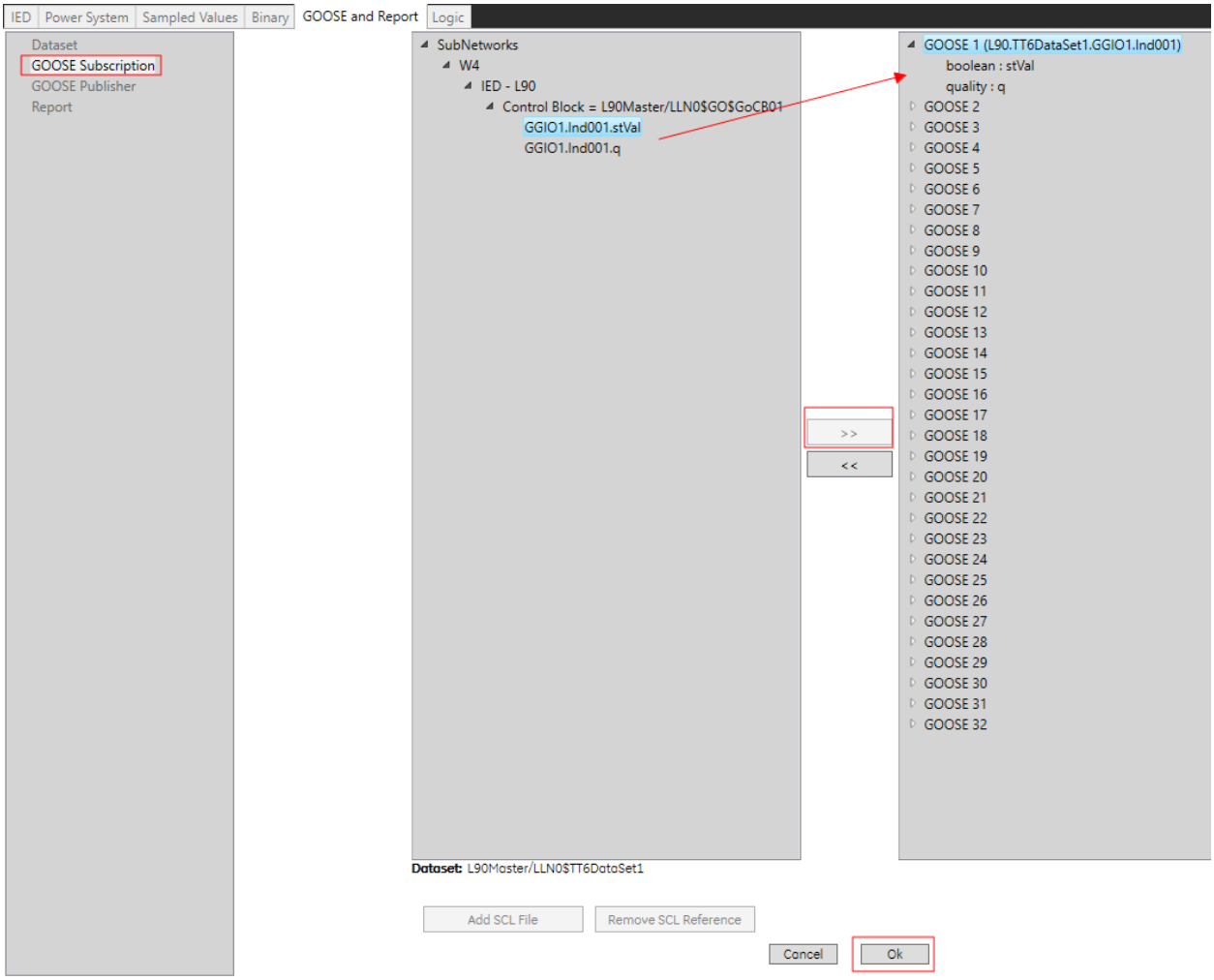
8. Under the **GOOSE and Report** tab, click the **GOOSE Subscription** option, and click the **Add SCL File** button. A window opens to select the CID file that was saved from the UR, and you import the CID file that was saved from the UR into the MU320 software.

Figure 5: MU320 Configurator window to import UR file



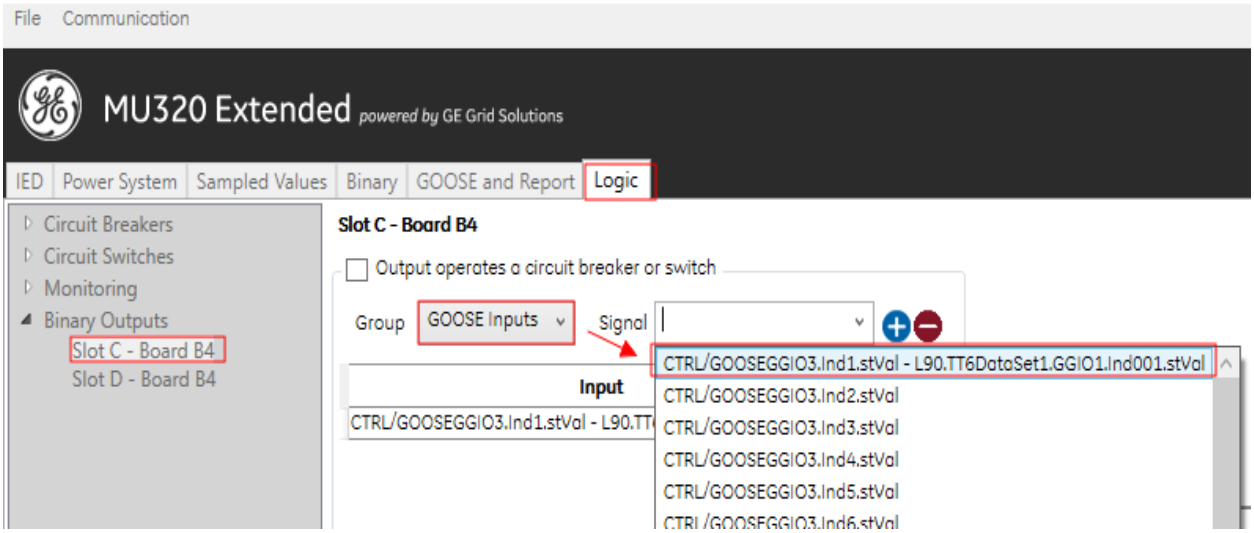
9. Click the UR device that was imported and map the data point from the transmission data sets (left side) to receiving GOOSE datasets (right side) in the MU320 unit. In this example, the status value and quality attribute associated to GGIO1 Indication 1 are mapped to GOOSE 1 boolean and quality respectively. Then click the **Ok** button to save the setting changes made.

Figure 6: Map status and quality to the UR



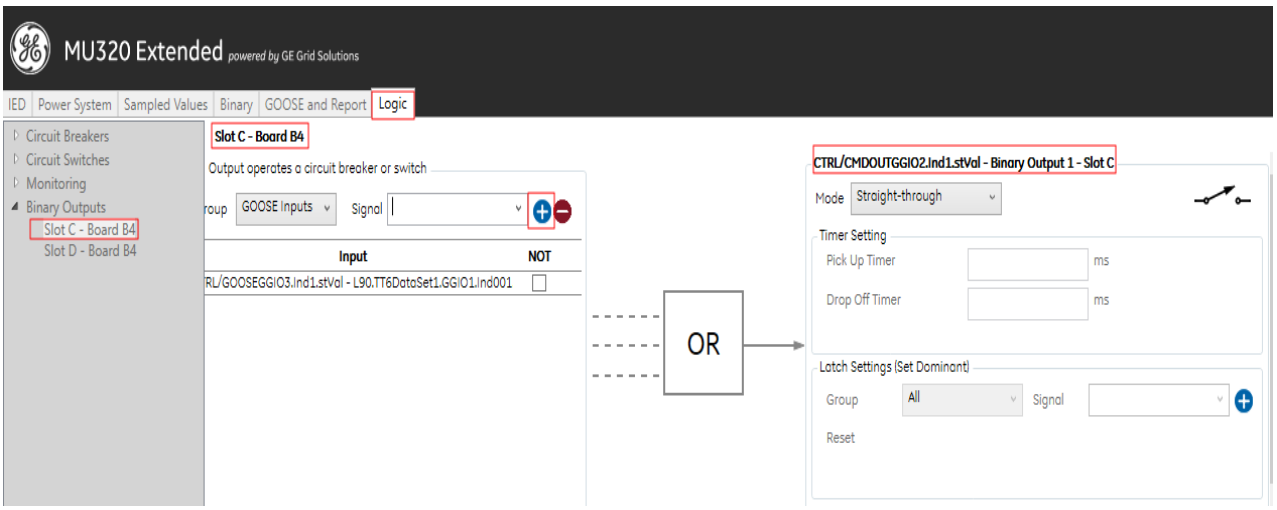
10. Under the **Logic** tab, access the **Binary Outputs**. In this example, select **GOOSE Inputs** for the **Group** of inputs, then select the first GGIO1 Ind1 that was mapped to receiving dataset for the signal source.

Figure 7: Select inputs



11. Once the signal source is selected, click the **+** (add) symbol. This ensures that the first contact output (CO1) on Slot C - Board B4 of the MU320 unit operates when the received GOOSE signal is asserted. Finally, click the **Ok** button at the bottom of window to save the settings.

Figure 8: Add the configuration and save

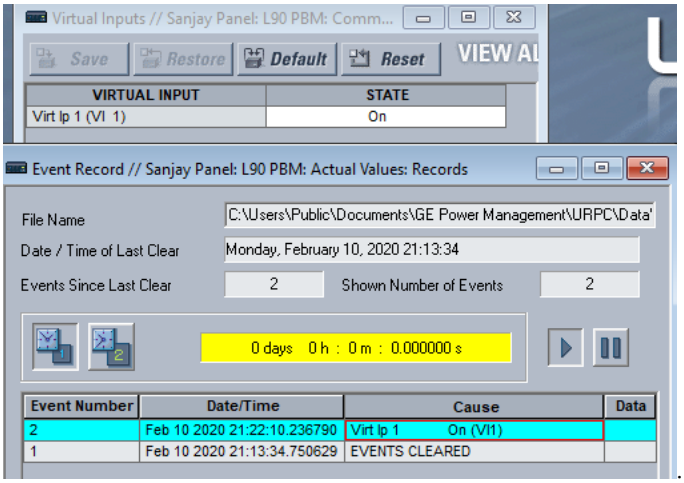


12. The settings have not been sent to the MU320 unit yet. To do so, click the **Communication > Send Configuration** menu. This saves the setting changes made to the MU320 unit.

Figure 9: Saving settings on the MU320 unit

Once the virtual input 1 is ON, an event is logged in the EnerVista UR Setup software, and contact output 1 (Slot C - Board B4) of the MU320 unit is asserted.

Figure 10: Event record in UR



In order to verify the status of the contact output of the MU320 unit, the contact output status is required to be sent back to UR relay as a GOOSE Boolean from MU320 (next section).

Configuration to receive contact outputs or breaker state statuses from MU320 in UR

The status of contact outputs that have operated in the MU320 unit or breaker statuses that are received as binary inputs in the MU320 unit are sent to the UR through peer-to-peer GOOSE messaging.

To establish this communication:

1. In the MU320 software, under the **GOOSE and Report** tab, go to **Dataset** and create a new dataset. In this example, a Test dataset has been created. Then map the CTRL/CMDOUTGGIO2.Ind1.stVal that is tied to Contact Output 1 status to one of the binary points in the "Test" dataset.

Figure 11: Create a test dataset

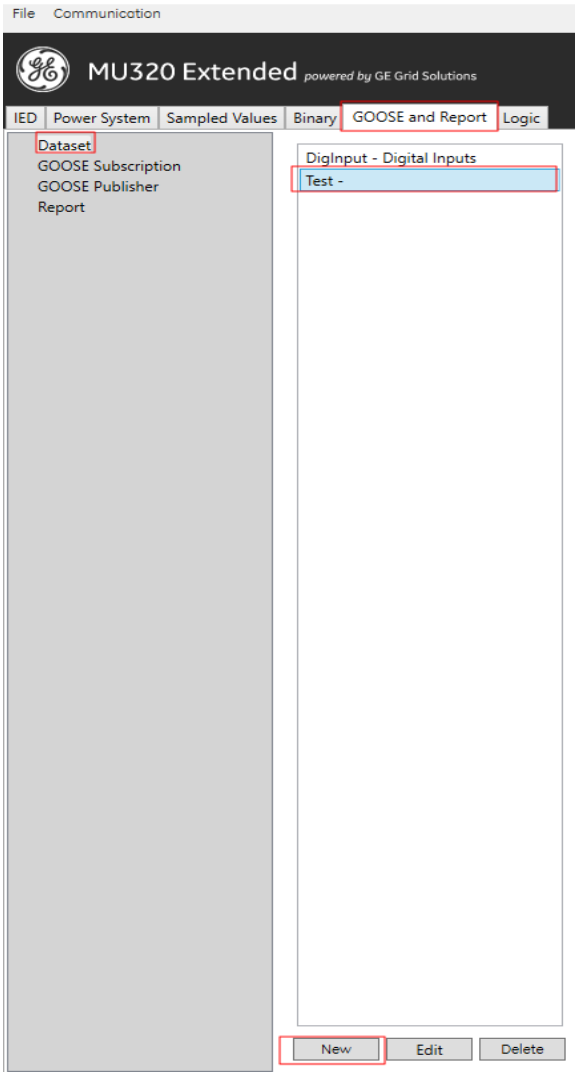
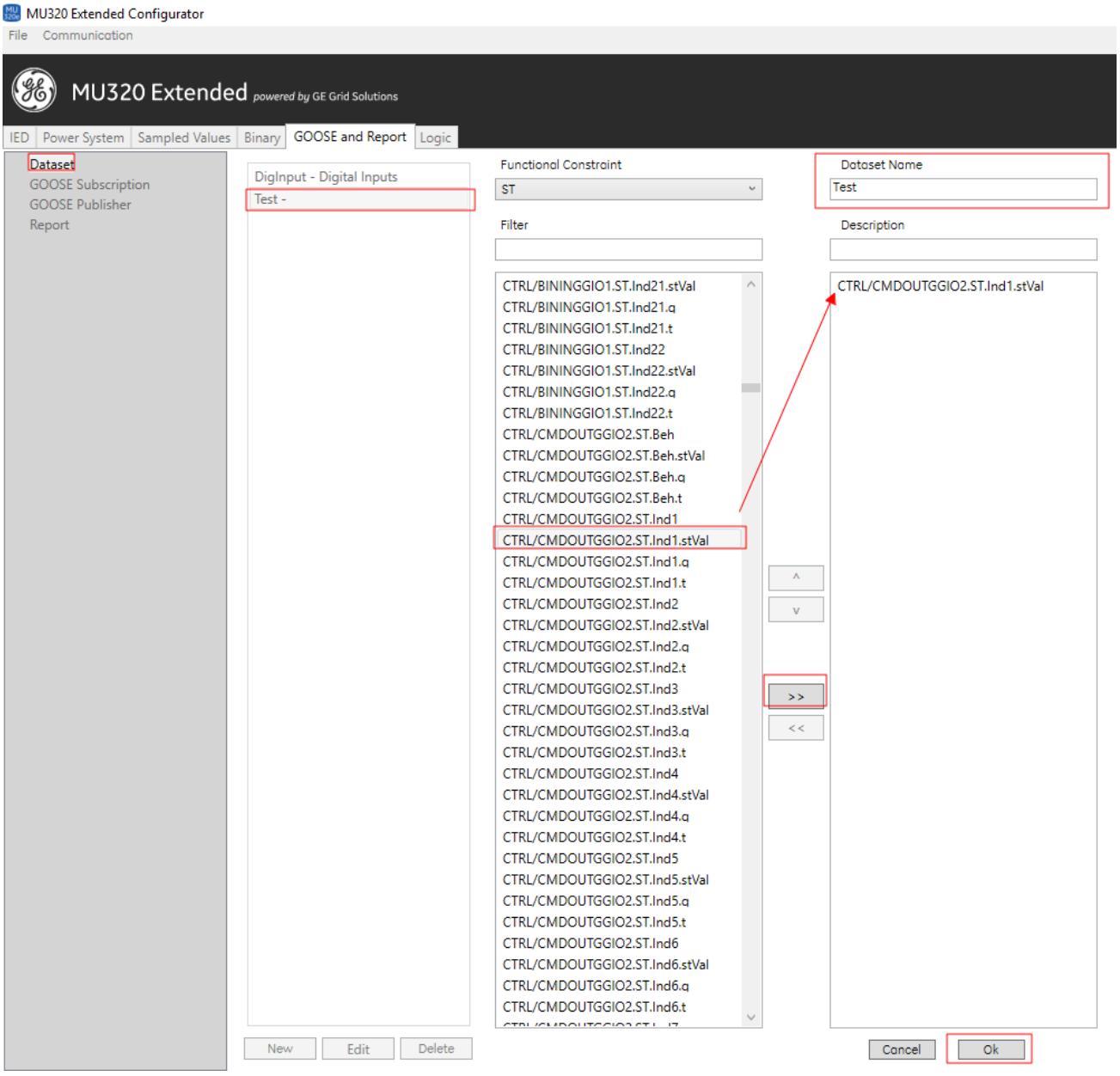
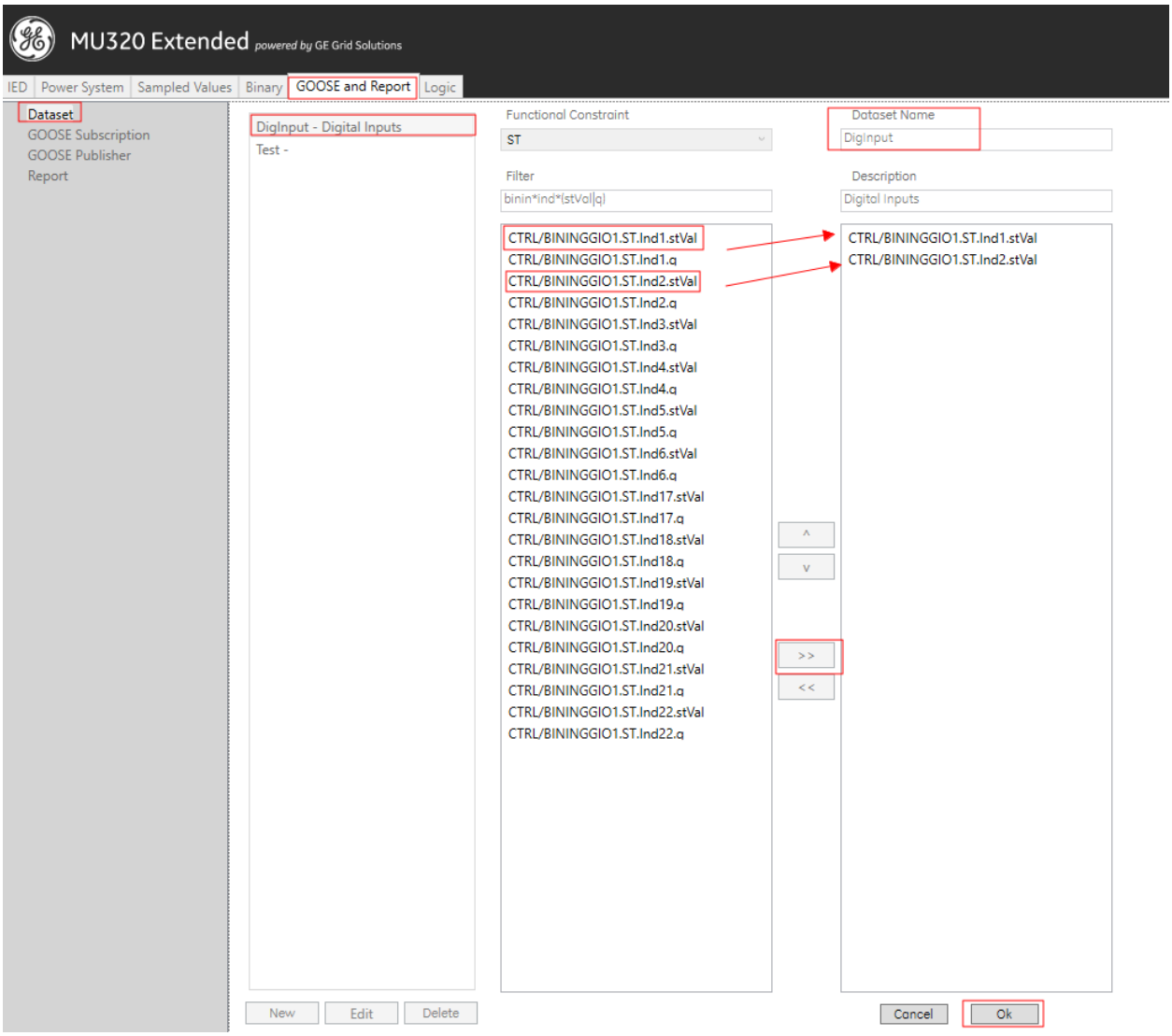


Figure 12: Map the output status to the test dataset



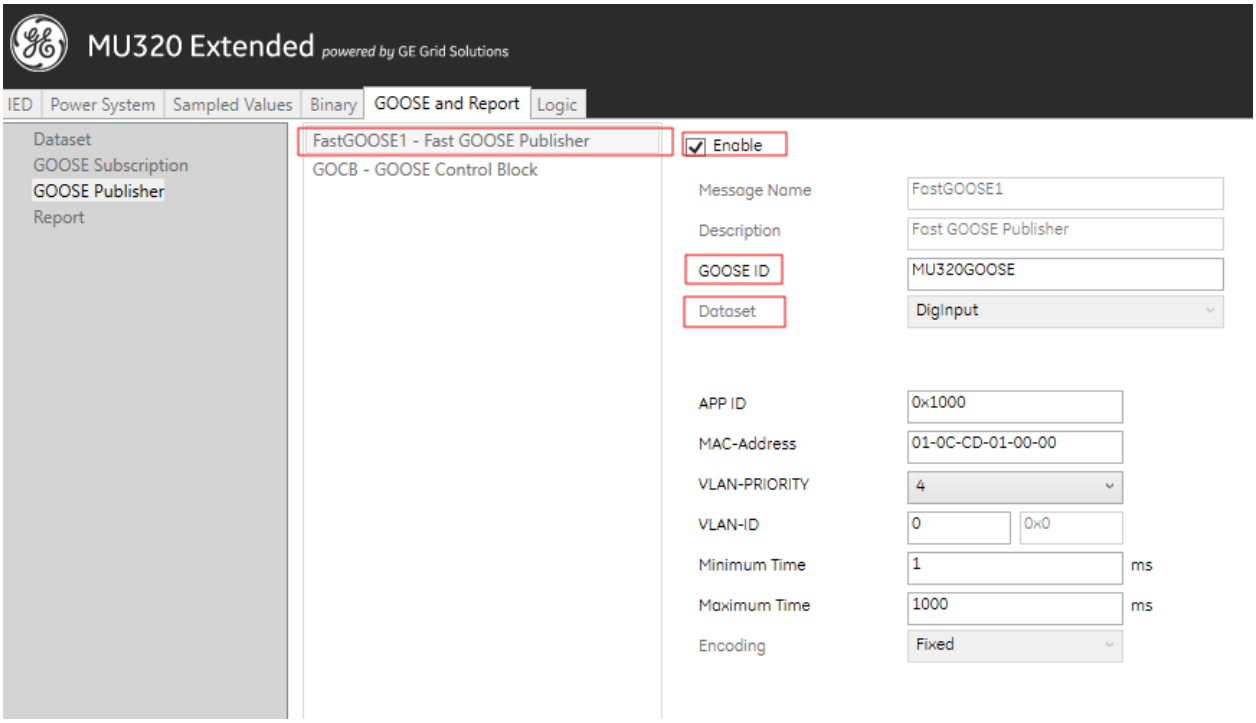
2. Note the DigInput dataset that is already available in MU320 unit by default. This dataset contains the binary points that are already mapped to binary/contact inputs of the MU320 unit. These inputs are wired to 52a/52b contacts of the breaker in order to receive the statuses of breakers, switches, isolators, or any other field contacts. In this example, consider Contact Inputs 1 and 2 are wired – where contact input 1 is always asserted (ON) and contact input 2 is tied to 52a contact of breaker that is operating on the basis of contact output 1 status that was configured in the previous section.
   Map CTRL/BININGGIO1.ST.Ind1.stVal and CTRL/BININGGIO1.ST.Ind2.stVal for transmission under DigInput dataset. Click the **OK** button to save the setting changes made on this page.

Figure 13: Map DigInput contact inputs



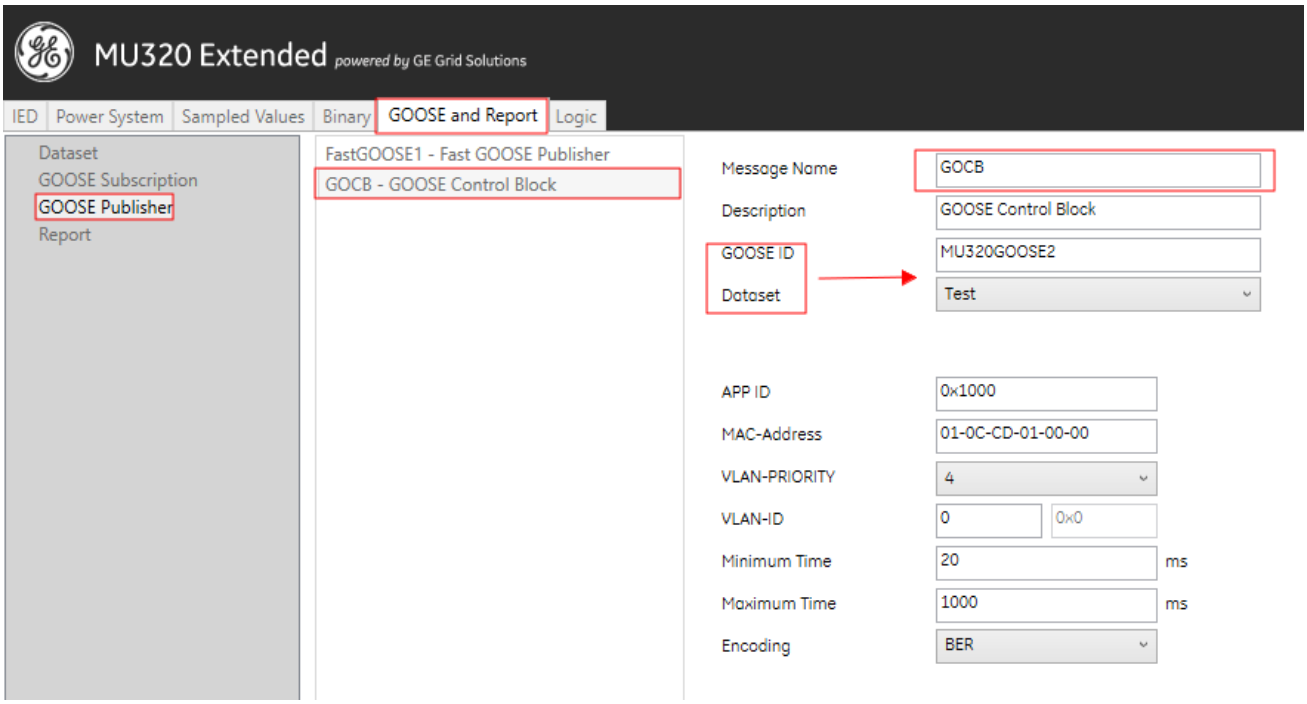
3. With the datasets created, access **GOOSE Publisher** under the **GOOSE and Report** tab. Note that the GOOSE message with FastGOOSE1 is already available. Edit this GOOSE message by enabling it, entering a **GOOSE ID**, and assigning the **Dataset** field to the DigInput that is associated to the binary inputs. Click the **Ok** button at the bottom of the window to save the changes.

Figure 14: Enable GOOSE messages and assign to dataset



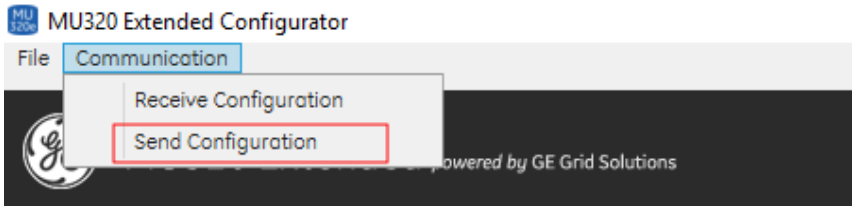
4. Create a new GOOSE message named GOCB with a **GOOSE ID** of MU320GOOSE2. Map the Test dataset that contains the status of contact output 1 to this GOOSE message. Click the **Ok** button to save the settings.

Figure 15: Create GOOSE message and map to dataset



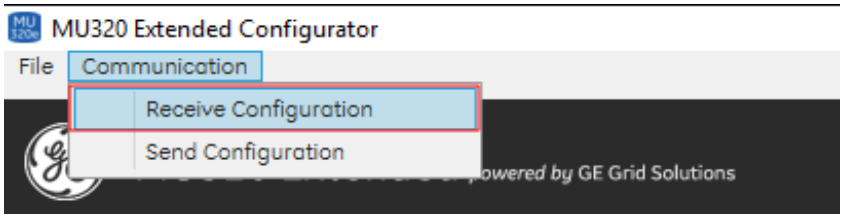
5. Send the settings to the MU320 unit using **Communication > Send Configuration**, and save it. This saves the setting changes made to the MU320 unit.

Figure 16: Send settings to merging unit



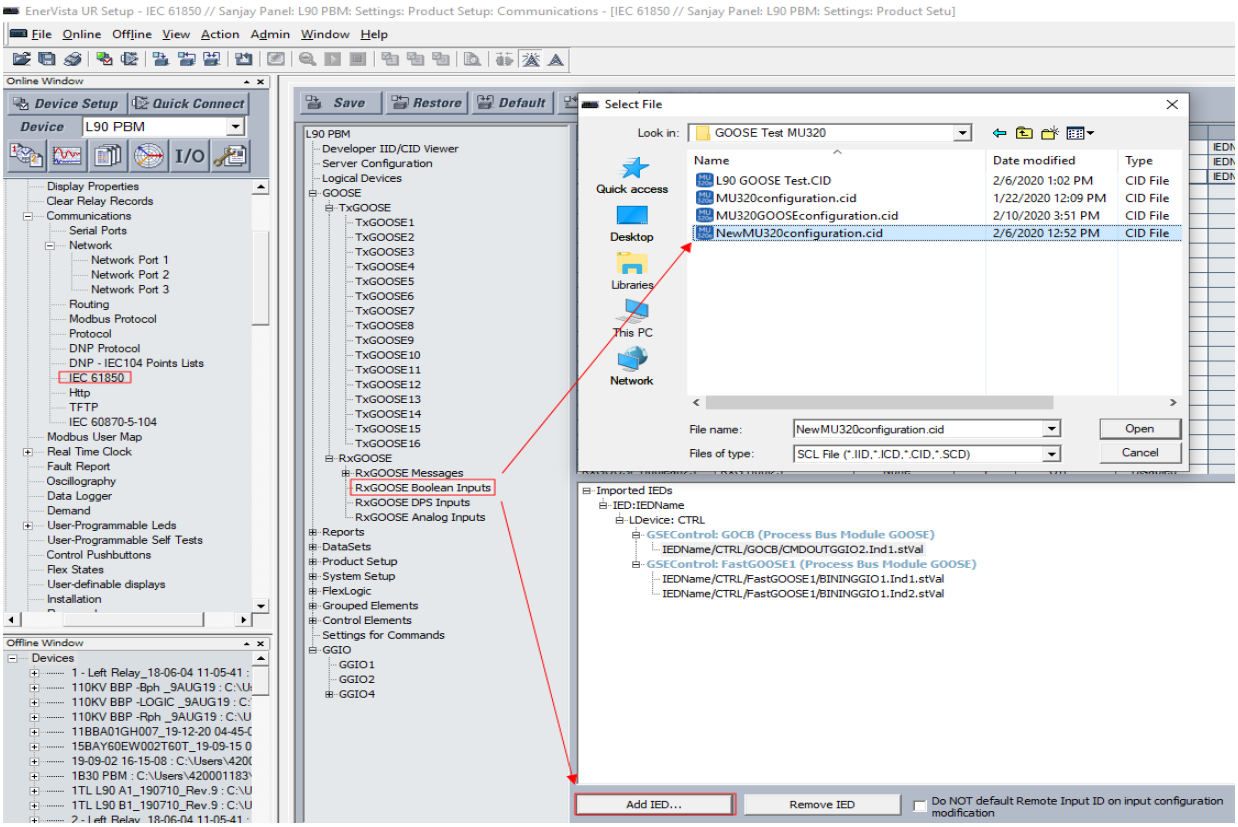
6. Once the settings have been saved to the MU320 unit, download the settings from the MU320 unit to the offline CID file on the computer by acccessing the **Communication > Receive Configuration** menu option.

Figure 17: Download settings from merging unit



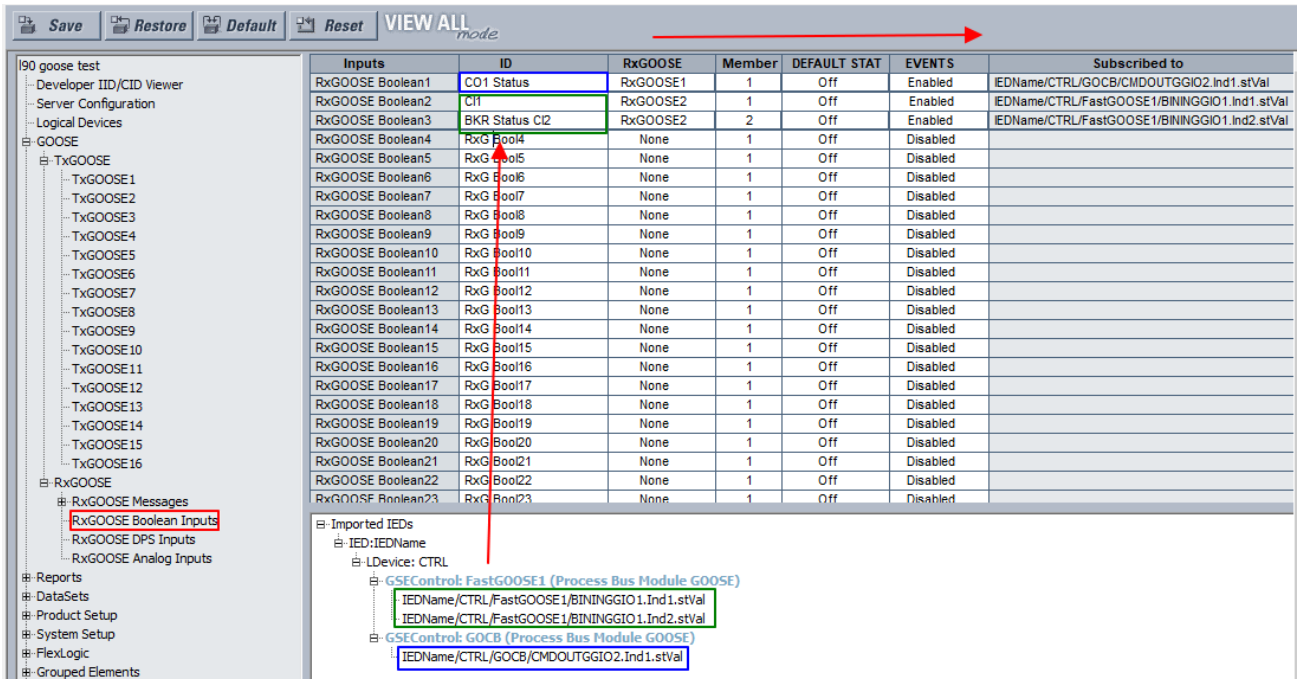
7. Once the settings file is saved on the computer from the MU320 unit, the file has to be imported in the UR. Access **Settings > Product Setup > Communications > IEC 61850 > RxGOOSE > RxGOOSE Bolean Inputs**. Click the **Add IED** button, and select the settings file (.CID) saved from the MU320 unit.

Figure 18: Import settings file in UR software



8. Once the CID file is imported, the transmitted GOOSE booleans from the MU320 unit are seen under the imported device. Map these binary points to RxGOOSE Booleans in the window by dragging and dropping to **RxGOOSE Boolean** fields. You can name the RxGOOSE Booleans in the **ID** field and enable the events for it. Events then are logged when RxGOOSE Booleans are asserted (it configures automatically the **Subscribed to** section).

Figure 19: Map binary points to RxGOOSE



9. Once the settings are saved in the UR, it completes GOOSE reception settings in the relay. The RxGOOSE messages are populated automatically.

Figure 20: Automatic completion of RxGOOSE1 settings

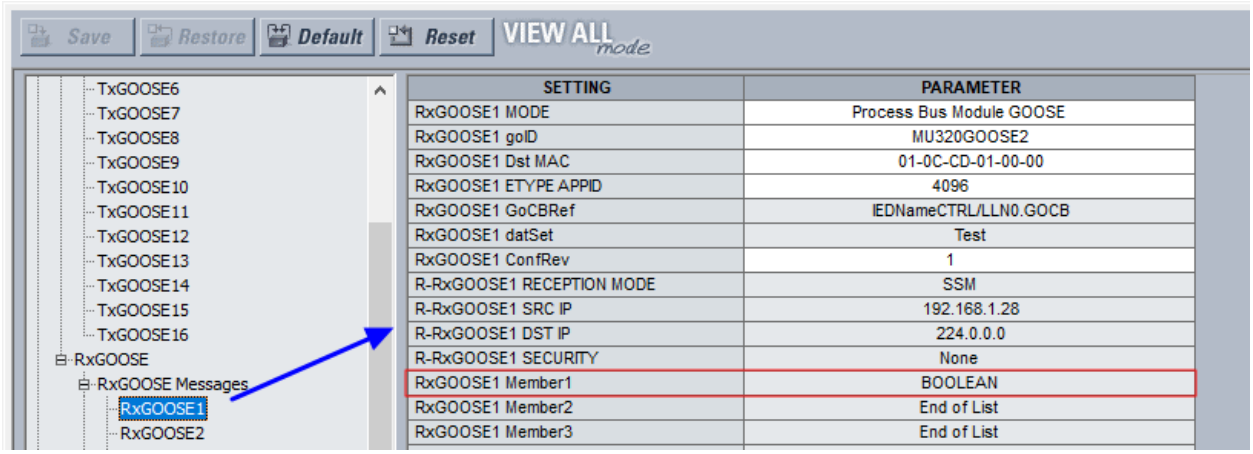
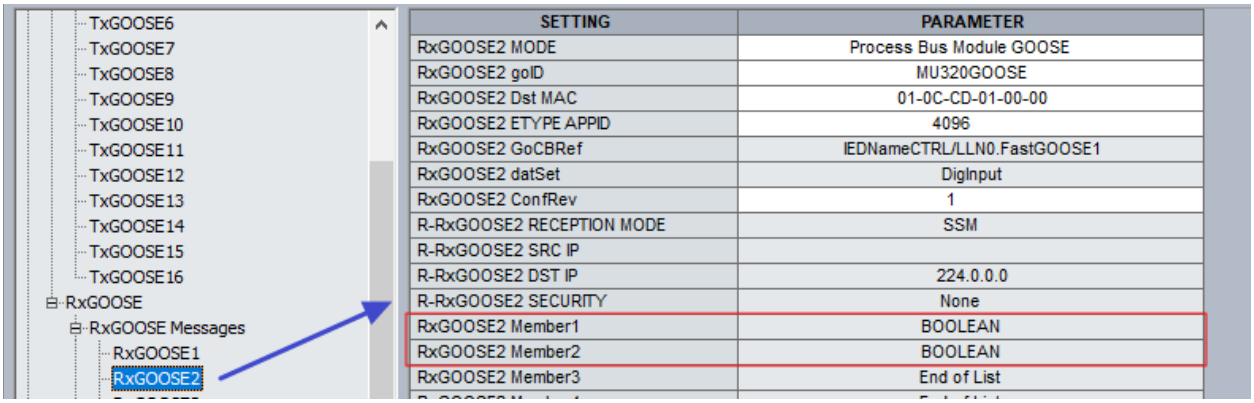


Figure 21: Automatic completion of RxGOOSE2 settings



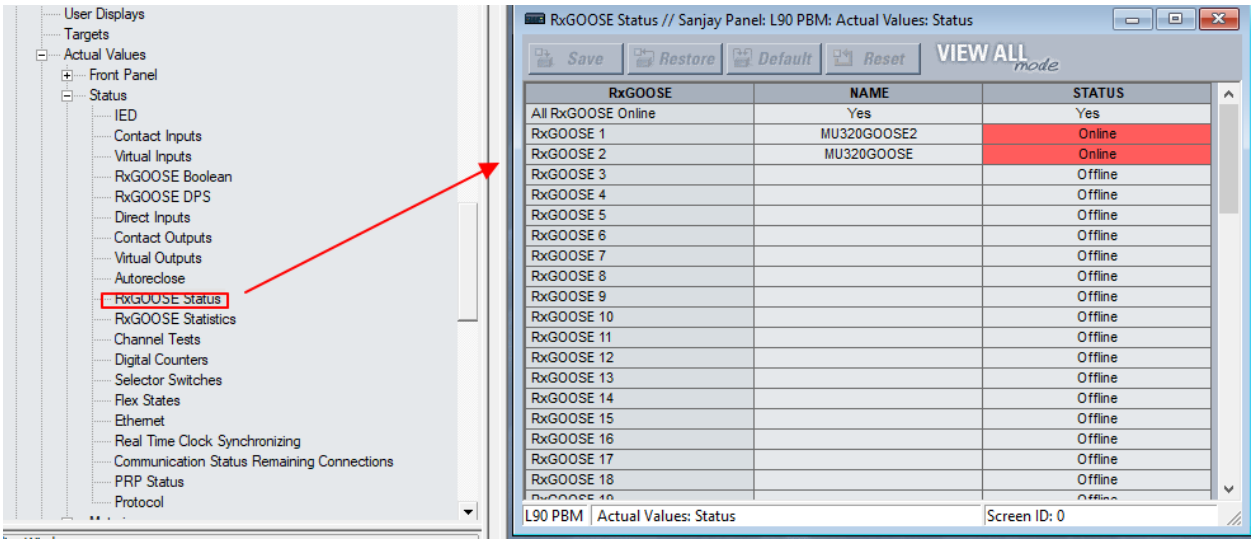
SETTING	PARAMETER
RxGOOSE2 MODE	Process Bus Module GOOSE
RxGOOSE2 goID	MU320GOOSE
RxGOOSE2 Dst MAC	01-0C-CD-01-00-00
RxGOOSE2 ETYPE APPID	4096
RxGOOSE2 GoCBRef	IEDNameCTRL/LLN0.FastGOOSE1
RxGOOSE2 datSet	DigInput
RxGOOSE2 ConfRev	1
R-RxGOOSE2 RECEPTION MODE	SSM
R-RxGOOSE2 SRC IP	
R-RxGOOSE2 DST IP	224.0.0.0
R-RxGOOSE2 SECURITY	None
RxGOOSE2 Member1	BOOLEAN
RxGOOSE2 Member2	BOOLEAN
RxGOOSE2 Member3	End of List

Status of remote devices and RxGOOSE Booleans

To check operation:

1. In the UR software, the **Actual Values > Status > RxGOOSE Status** window displays whether the configured RxGOOSE messages are online. In this example, both RxGOOSE messages MU320GOOSE and MU320GOOSE2 are received from the same MU320 unit and they are online.

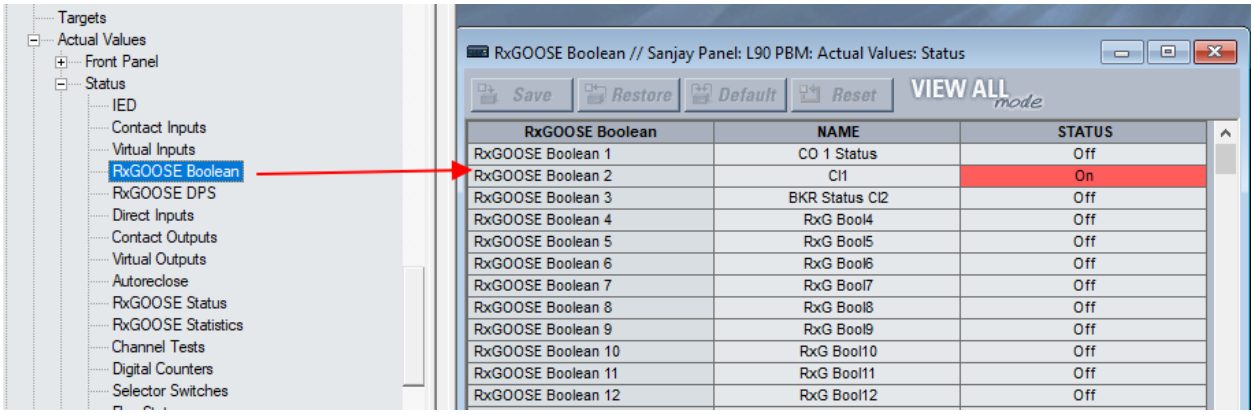
Figure 22: Check RxGOOSE status



RxGOOSE	NAME	STATUS
All RxGOOSE Online	Yes	Yes
RxGOOSE 1	MU320GOOSE2	Online
RxGOOSE 2	MU320GOOSE	Online
RxGOOSE 3		Offline
RxGOOSE 4		Offline
RxGOOSE 5		Offline
RxGOOSE 6		Offline
RxGOOSE 7		Offline
RxGOOSE 8		Offline
RxGOOSE 9		Offline
RxGOOSE 10		Offline
RxGOOSE 11		Offline
RxGOOSE 12		Offline
RxGOOSE 13		Offline
RxGOOSE 14		Offline
RxGOOSE 15		Offline
RxGOOSE 16		Offline
RxGOOSE 17		Offline
RxGOOSE 18		Offline

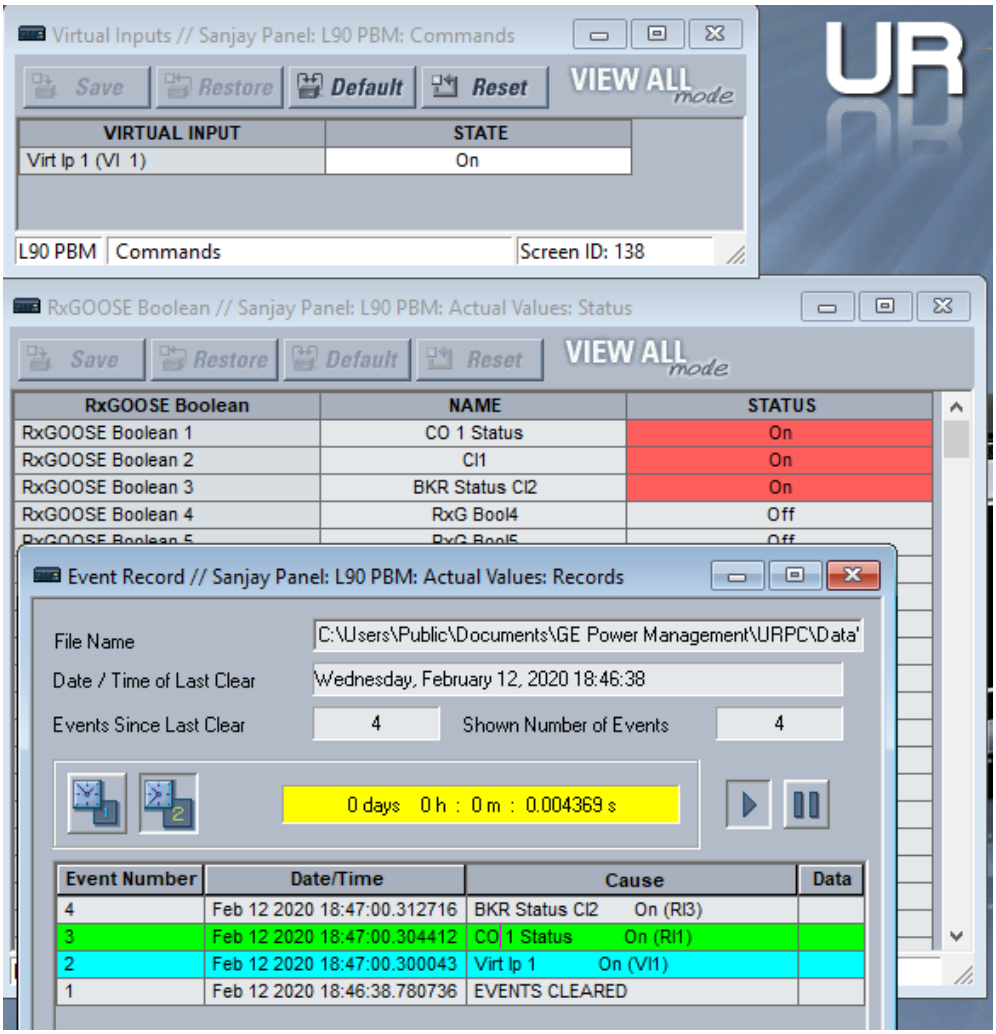
2. Under the **RxGOOSE Boolean** option, you can view the status of the each GOOSE Input. Binary Input 1 is always asserted in the MU320 unit, hence the CI1 status indication in the relay is On.

Figure 23: Check input status



3. When Virtual Input 1 is On, the Contact Output 1 from the MU320 unit also is On (status is received in UR) and the corresponding breaker status is received as On via GOOSE as RxGOOSE Boolean 3. Since the events are enabled in the UR, events are registered in **Actual Values > Records > Event Record**. Note the timing difference between the events of trip command (Virtual Input 1 ON) sent to the MU320 unit and contact output 1 status received in the UR. It is around 4.3 ms. Considering the GOOSE transmission and reception time of Fast Datasets in URs and the operating time for contact output of the MU320 unit, after the trip command is sent from relay, the difference can be expected to be less than or equal to 4 ms.

Figure 24: View event record



Conclusion

These examples help to understand the configuration required in a UR and the MU320 unit for operating contact outputs and determining the binary input statuses.

The MU320 unit does not have event records to record binary input and output statuses. The Actual Values menu in the MU320 unit does not indicate statuses for its binary inputs and outputs. GE therefore recommends enabling the events in the UR for the operands that are driving the contact outputs in the MU320 unit as well as for the GOOSE inputs that are received in the UR from the MU320 unit.

For further assistance

For product support, contact the information and call center as follows:

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